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Shock and Vibration Symposium Abstract

Title: Characterizing the Response of Composite Panels to a Pyroshock Induced Environment using Design of Experiments Methodology

This experimental study seeks to quantify the impact various composite parameters have on the structural response of a composite structure in a pyroshock environment. The prediction of an aerospace structure's response to shock induced loading is largely dependent on empirical databases created from collections of development and flight test data. While there is significant structural response data due to shock induced loading for metallic structures, there is much less data available for composite structures. One challenge of developing a composite shock response database as well as empirical prediction methods for composite structures is the large number of parameters associated with composite materials. This experimental study uses data from a test series planned using design of experiments (DOE) methods. Statistical analysis methods are then used to identify which composite material parameters most greatly influence a flat composite panel's structural response to shock induced loading. The parameters considered are panel thickness, type of ply, ply orientation, and shock level induced into the panel. The results of this test will aid in future large scale testing by eliminating insignificant parameters as well as aid in the development of empirical scaling methods for composite structures' response to shock induced loading.